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December 24, 2003

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REC'D

DEC 30 2003

RCAP

Subject: Indoor Air Quality Assessment Final Report
Results of March 2003 Indoor Air Quality Assessment
Modine Manufacturing Company
Camdenton, Missouri

Dear Ms. Kump-Mitchell:

Please find enclosed two copies of the above-referenced final report that CH2M HILL is submitting on behalf of Modine Manufacturing Company. The report presents the findings from the indoor air sampling activities conducted in March 2003 and incorporates input provided by the Missouri Department of Natural Resources. Please feel free to call Tom Sanicola (262-636-1649) or me (314-421-0313 Ext. 265) with any questions you may have.

Sincerely,

CH2M HILL

Daniel J. Price, R.G.
Project Manager

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c: Thomas Sanicola - Modine Manufacturing Company
Bob King - Modine Manufacturing Company
Steven Poplawski - Bryan Cave LLP
David Garrett - EPA Region VII
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RCRA RECORDS

*Indoor Air Quality Assessment
Final Report*

Results of March 2003

Indoor Air Quality Assessment

Prepared for
Modine Manufacturing Company

December 2003

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Contents

1	Introduction	1
	1.1 Background and History.....	1
	1.2 Air Quality Assessment.....	1
2	IAQ Assessment.....	3
	2.1 Work Planning Activities.....	3
	2.2 Air Sampling Locations	4
	2.3 Sampling Procedures.....	4
	2.4 Sample Analysis	5
3	Analytical Results.....	7
4	Development of Screening Criteria.....	9
5	Conclusions.....	12
6	Methods for Assuring Environmental Indicator for Human Exposure Under Control	15
	6.1 Annual Health & Safety Monitoring Air Sampling	15
	6.2 Annual Health & Safety Monitoring Sampling Results	15
7	References	17

Tables

1	Chemicals of Concern	6
2	Summary of Results - March 2003.....	8
3	Calculation of Risk-Based Concentrations in Ambient Air	11
4	Comparison Table.....	13
5	Evaluation of Cumulative Risks	14

Figures

1	Site Location Map
2	Indoor Air Sampling Locations

Appendices

A	CH2M HILL Standard Operating Procedure for Canister Integrated Sampling
B	Canister Certifications
C	Laboratory Analytical Data Sheets and Chain of Custody
D	NIOSH Method Results

SECTION 1

1 Introduction

This report summarizes the activities and findings of the Indoor Air Quality (IAQ) Assessment conducted during March 2003 at the Modine Manufacturing Company (Modine) facility in Camdenton, Missouri. The IAQ Assessment was conducted as a continuation of the Corrective Action work conducted pursuant to the Missouri Department of Natural Resources (MDNR) Corrective Action Abatement Order on Consent issued in July 1999, the Corrective Action Work Plan and three subsequent addenda approved by MDNR.

The IAQ Assessment was conducted in accordance with the Corrective Action Work Plan Addendum 3 (CH2M HILL, December 2002) submitted to the MDNR in December 2002. Comments provided by MDNR were addressed and incorporated into the project activities. Verbal and subsequent email approval of the work plan with modifications was provided by MDNR in March 2003.

1.1 Background and History

Modine manufactures heat transfer products at the Camdenton facility located at 179 Sunset Drive, southwest corner of Sunset Drive and Dawson Road (Figure 1). Several investigations were conducted to identify the nature and extent of the contamination from chlorinated volatile organic compounds (VOCs) in subsurface soil at the site. Based on the results of these investigations, corrective actions were implemented as summarized below.

- In October and November 2001, excavation was performed of soil impacted with chlorinated VOCs in excess of MDNR Cleanup Levels for Missouri (CALM) Soil Target Concentrations (STARC) Leaching to Groundwater (C_{LEACH}) levels. Approximately 4,800 cubic yards of soil were excavated, segregated, and stockpiled. Of that volume, 3,000 cubic yards exceeded the STARC levels.
- Because the volume of impacted soil was significantly more than originally estimated, excavation activities ceased and a subsurface investigation was implemented to better define the extent of impacted soil.
- Based on the investigation, alternative site-specific soil cleanup action levels were developed.
- In early March 2002, a total of 2,812 tons of impacted stockpile soil from the October/November, 2001 excavation, was disposed of as special waste.
- In May and June 2002, 4,614 tons of VOC impacted soil exceeding site-specific cleanup levels was excavated and transported to a landfill for disposal as a special waste and the site was restored.

1.2 Air Quality Assessment

An indoor air quality assessment was requested by MDNR, to complete an Environmental Indicator (EI) determination (Current Human Exposures Under Control) for the Modine

facility. The Environmental Indicator program is used by the Environmental Protection Agency (EPA) to track progress at sites under the RCRA Corrective Action Program.

Results from previous investigations indicated the possibility that residual chlorinated VOC concentrations below the site specific action levels could be present in the soil beneath the Modine facility. Thus, a potential pathway exists for contamination to migrate from residual VOCs in the soil to the air inside the plant. The objective of the IAQ assessment was to investigate this potential pathway and determine if unacceptable human exposure to VOCs migrating to indoor air from soil was occurring at the facility.

The use of the Johnson and Ettinger model (USEPA, 2000) was originally proposed to make the EI determination. However, direct measurement was considered to be a more appropriate method for evaluating the potential exposure pathways and, with the concurrence of MDNR, indoor air sampling was proposed for evaluating potential human exposure pathways at the facility related to VOC migration from soil.

2 IAQ Assessment

The IAQ Assessment tasks included work planning activities and sample collection.

2.1 Work Planning Activities

As part of the work-planning process, a pre-sampling assessment of the facility was conducted to determine the most appropriate sampling locations. The assessment consisted of a review of facility plans and an interview with Modine plant management to delineate areas of interest for air sampling within the Modine plant. The assessment differentiated specific areas of the plant based on separate heating, ventilation, and air conditioning (HVAC) systems, plant construction and renovation details, equipment locations and current usage of plant areas.

Sample locations were selected where a higher potential was assumed to exist for air transfer between the soil beneath the building and the indoor air (i.e., areas where floor breaches occur), and where prior activities at the facility may have caused subsurface contamination. Additionally, at least one sample was collected in each of the three separate HVAC system service areas at the plant.

Prior to submittal of the Work Plan, Modine proposed comparing the analytical results from the air sampling to 1% of the Occupational Safety and Health Administration (OSHA) standard for protection of worker health. At the request of MDNR, the Work Plan presented risk-based screening levels based on a worker exposure scenario for data comparison purposes. Consequently, the analytical method for sample analysis was modified to lower the analytical detection limits for the Chemicals of Concern (COCs), in order to accommodate the lower comparison levels.

Work Plan Addendum 3 - Corrective Action Indoor Air Quality assessment was prepared and submitted to the MDNR in December, 2002. The Work Plan specified sampling indoor air for three residual COCs that were found in soil at the facility during the previous investigations: trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride. Collection of air samples from six locations within the Modine facility, with one duplicate and one blank sample were proposed in the Work Plan.

Following review of the Work Plan, MDNR requested additional modifications in a letter dated February 28, 2003. Modine submitted a written response on March 3, 2003; and the following modifications were agreed upon verbally and documented in an email from MDNR on March 7, 2003. Those modifications were:

- Collection of an ambient outdoor air sample.
- Comparison of results to both industrial and residential risk-based target concentrations.
- The addition of five constituents to the analyte list: 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), tetrachloroethene (PCE), and methylene chloride.

It should be noted that the Work Plan Addendum 3 was not changed and re-issued to reflect these modifications. Final agreement between Modine and the MDNR to the modifications listed above was reached on March 7, 2003. MDNR's concurrence letter was dated March 24, 2003.

2.2 Air Sampling Locations

As agreed upon, air samples were collected from six locations within the Modine facility and one outside of the facility. One duplicate sample and one blank sample were also collected. Air sampling locations are identified below and shown on Figure 2:

- MD-AS-01 was collected in the main conference room of the office wing located at the northeast corner of the building.
- MD-AS-02 was collected behind the women's restroom, near the sinks and one floor drain at the northwest corner of the building.
- MD-AS-03 was collected under the conveyor belt in the northeast section of the plant close to the oven room and a six-foot deep concrete lined pit that drains to the pre-treatment waste line.
- MS-AS-04 was collected in the training room near the chemical storage area on the west side of the building.
- MD-AS-05 was collected on a storage shelf, approximately 5 feet above the floor, next to the welding bays in the center of the plant. Duplicate sample MD-AS-08 was also collected at this location.
- MD-AS-06 was collected in the south section of the plant within the footprint of the historical monorail degreaser. The former monorail degreaser was once a below surface grade production operation using volatile organic chemicals. The area was renovated and is now covered with grade-level concrete flooring.
- MD-AS-07 was collected outside the building, away from potential VOC sources (propane tanks, loading dock, etc.), in a grassy area near the southeast corner of Modine property.
- MD-AS-B1 was the blank sample stored in the multipurpose room in the office wing of the plant throughout the sampling event.

2.3 Sampling Procedures

The Indoor Air Quality Assessment sampling attempted to approximate potential 'worst case conditions' for the soil to indoor air exposure pathway. The state of Massachusetts (MADEP, 2002) has identified some generic conditions under which greater vapor migration from soil or groundwater may occur. These conditions are:

- Highest potential for vapor migration is during late winter/early spring.
- Indoor temperatures are 10 degrees F greater than outdoor temperatures.
- Winds greater than 5 miles per hour.

- Soils around the building saturated by precipitation.
- Mechanical heating system in operation.
- Mechanical fans off and doors and windows closed.

While it is not well understood how these environmental conditions may affect the magnitude of vapor intrusion, the attempt was made to conduct the IAQ assessment under conditions when significant vapor migration from soil could be expected to occur. Specifically, the IAQ assessment was conducted on March 19-20th 2003. The average temperature over the two-day period was approximately 52 degrees Fahrenheit in Columbia, Missouri located approximately 90 miles north (National Weather Service).

Air samples were collected using 24-hour integrated canister sampling. The use of canisters ensured that a sample could be collected over the time period required (24 hours) and enabled the subsequent laboratory analysis of the specific COCs at the desired detection limits. This method involved placing an evacuated stainless steel canister in each of the sample locations. Each canister had a preset sampling flow rate, established accurately by the laboratory. After the valve was opened, the canister continuously collected an air sample over the 24-hour period until the valve was closed. Refer to Appendix A, Standard Operating Procedure for Canister Integrated Sampling, for additional details.

Canister vacuum was measured in the field prior to sampling using a vacuum gauge. The canisters were then set in place at each sample location, and the valve opened to allow the sampling to commence at the pre-set flow rate. Canisters were checked periodically and were found to be operating without interference. After the 24-hour samples were collected the final vacuum on each canister was measured and the valves were tightly secured. The canisters were shipped back to the laboratory for analysis via overnight delivery.

The blank sample canister (MD-AS-B1) was measured for start and ending vacuum with the same gauge as all other samples. Canister vacuum measurements were made in the multipurpose room in the office wing. The blank sample canister remained in the multipurpose room with the valve closed during the sampling event.

2.4 Sample Analysis

Samples were analyzed by the CH2M HILL Applied Science Group Laboratory in Corvallis, Oregon. Two analytical methods were performed on each sample. USEPA Method TO-14 for volatile organic compounds was performed using a gas chromatograph with a mass spectrometer detector (GC/MS). This analysis provided adequately low detection limits for five of the eight COCs. Selected Ion Monitoring (TO-14 SIM) was conducted for three analytes - PCE, TCE, and vinyl chloride. The SIM analysis enabled lower detection limits to be achieved for these COCs. Table 1 lists the COCs and the analytical reporting limits used for this project. Reporting limits are reported in units of parts per billion by volume (ppbv).

Table 1
Chemicals of Concern (COCs)

Chemical of Concern	Analytical Method Detection Limit (ppbv)
1,1-dichloroethane (1,1-DCA)	1
1,1-dichloroethene (1,1-DCE)	1
cis-1,2-dichloroethene (cis-1,2-DCE)	1
methylene chloride	1
tetrachloroethene (PCE)	0.005
1,1,1-trichloroethane (1,1,1-TCA)	1
trichloroethene (TCE)	0.004
vinyl chloride	0.004

The sample canisters were tested by the laboratory prior to shipping. Each canister contained SIM analysis constituents at concentrations less than the laboratory reporting limit (i.e., 0.004 ppbv). The nine canister certifications are provided in Appendix B. The canister certification initially reported for one canister (can 544) was from the wrong date and showed an unacceptable level of PCE. The correct certification showed all compounds met the levels for certification. The correct certification for this canister is included with this report.

3 Analytical Results

The analytical results from the March 2003 sampling of indoor and outdoor air at the Modine facility are summarized in Table 2 in units of ppbv. The results are also briefly discussed in the following paragraphs. Laboratory analytical data sheets are provided in Appendix C.

Indoor Samples

Low concentrations of five COCs (TCE, PCE, cis-1,2-DCE, vinyl chloride, and methylene chloride) were detected in the indoor air samples.

TCE and PCE were detected in samples from each of the six indoor locations. The maximum detected TCE concentration was 61.5 ppbv in sample MD-AS-02 collected near the northwest corner of the building behind the women's restroom where floor breaches (piping and drains) occur. The maximum detected PCE concentration was 0.602 ppbv in sample MD-AS-05 collected near the welding bays in the center of the plant.

Detectable concentrations of cis-1,2-DCE were present in two of the six samples. Both reported detection were flagged as estimated values and concentrations were below 1 ppbv.

Vinyl chloride and methylene chloride were detected in three of the six samples, but not in the same samples. None of the vinyl chloride concentrations exceeded 0.015 ppbv. The maximum detected methylene chloride concentration was 1.13 ppbv in sample MD-AS-01 collected in the main conference room of the office wing located at the northeast corner of the building.

The duplicate sample, MD-AS-08, was submitted blind to the laboratory. Analytical results corroborated those of MD-AS-05.

Outdoor Sample

TCE and PCE were detected at very low concentrations in the outdoor air sample. TCE and PCE concentrations were 0.204 ppbv and 0.053 ppbv, respectively.

Blank Sample

A detection of TCE, at 0.025 ppbv, was detected in the blank sample, MD-AS-B1. This result was noticeably higher than the precertification value for the canister.

Table 2
Summary of Results
March 2003

Field ID	Description	Analytical Method	Analyte	Result (ppbv)	Lab Q
MD-AS-01	Office wing	TO14	Methylene chloride	1.1	
	conference	TO14-SIM	Tetrachloroethene	0.2	
	room	TO14	Trichloroethene	14.6	
MD-AS-02	Office wing	TO14	Cis-1,2-Dichloroethene	0.9	J
	restroom	TO14	Methylene chloride	0.6	J
	sink area	TO14-SIM	Tetrachloroethene	0.517	
		TO14	Trichloroethene	61.5	
MD-AS-03	NE plant	TO14-SIM	Tetrachloroethene	0.578	
	corner	TO14	Trichloroethene	46.7	
MD-AS-04	Training room	TO14-SIM	Tetrachloroethene	0.443	
	near chem.	TO14	Trichloroethene	56.5	
	storage area	TO14-SIM	Vinyl chloride	0.009	
MD-AS-05	Center of	TO14-SIM	Tetrachloroethene	0.602	
	plant near	TO14	Trichloroethene	42.2	
	welding bays	TO14-SIM	Vinyl chloride	0.015	
MD-AS-06	S end of plant	TO14	Cis-1,2-Dichloroethene	0.6	J
	in historical	TO14	Methylene chloride	0.8	J
	degreaser	TO14-SIM	Tetrachloroethene	0.528	
	location	TO14	Trichloroethene	34.6	
MD-AS-07	OUTSIDE	TO14-SIM	Tetrachloroethene	0.053	
	SAMPLE	TO14-SIM	Trichloroethene	0.204	
MD-AS-08	Duplicate of	TO14-SIM	Tetrachloroethene	0.582	
	MD-AS-05	TO14	Trichloroethene	42.7	
		TO14-SIM	Vinyl chloride	0.015	
MD-AS-B1	Blank	TO14-SIM	Trichloroethene	0.025	

4 Development of Screening Criteria

The current guidance for Human Exposure Under Control EI determinations is the EPA Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (USEPA, November 2002). This guidance was developed for use in residential settings and contains no methodology or screening levels for evaluating potential vapor intrusion pathways in workplaces. The EPA does not expect this guidance to be used for settings that are primarily occupational. The draft guidance states "OSHA and EPA have agreed that OSHA generally will take the lead role in addressing occupational exposures. Since, workers will generally understand the workplace (e.g., OSHA) regulations (and monitoring, as needed) that already apply and provide for their protection."

Consequently, the EI determination for the indoor air pathway in workplaces typically has been based on comparison of canister sampling results to occupational standards. OSHA establishes Permissible Exposure Limits (PELs) as their screening level for workplace exposures based on an 8-hour time weighted average (TWA) concentration.

In the original draft of this report submitted to the MDNR for review and comment, Modine took what was believed to be a conservative approach to the screening levels. The draft report used the lower value from the following sources for comparison to the IAQ assessment results and to demonstrate achievement of the EI: (1) regulatory established OSHA PELs, (2) guidance exposure limits established by National Institute of Occupational Safety and Health (NIOSH) - Recommended Exposure Levels (RELs), and (3) guidance exposure limits established by the American Conference of Governmental Industrial Hygienists (ACGIH) - Threshold Limit Values (TLVs).

At the request of MDNR risk-based screening levels were developed using a worker exposure scenario in accordance with the EPA's *Risk Assessment Guidance for Superfund. Vol. 1 Human health Evaluation Manual. Supplemental Guidance "Standard Exposure Factors"*, March 1991 (EPA, 1991). A Target Cancer Risk of 1×10^{-4} and a Target Hazard Quotient of 1.0 were used to calculate the industrial worker exposure scenario using the following input parameters:

- Exposed Population - Adults only
- Average Body weight - 70 kilograms (kg)
- Inhalation Rate - 1 cubic meter per hour (m^3/hr) based on activities conducted at the facility being classified as light to moderate activity level in accordance with EPA's Exposure Factors Handbook (EPA, 1997)
- Exposure time - 9 hours per day (hr/day) based on an 8 hour work day, 0.5 hour lunch break, and 0.25 hours on either side of clocking in and out.
- Exposure frequency - 250 days per year (5 days per week - 50 weeks per year)
- Exposure duration - 25 years

These factors as well as the averaging time for carcinogenic and non-carcinogenic effects to manifests themselves are also provided in the Table 3 which illustrates how the final screening levels were calculated.

The Inhalation Slope Factors used in the calculations were derived from various sources depending on the chemical. Inhalation Slope Factors were derived from the following sources:

- EPA's IRIS (Integrated Risk Information System) database or HEAST (Health Effects Assessment Summary Tables) document for cis-1,2-DCE, methylene chloride and vinyl chloride.
- California Environmental Protection Agency's (Cal-EPA) Office of Environmental Health and Hazards Assessment (OEHHA) database for TCE and PCE.

The slope factor for TCE developed by California EPA was selected for use in developing screening levels based on recent EPA guidance and adoption by other EPA regions. The currently proposed EPA slope factor is presented in the revised health risk assessment for TCE, issued in draft in August 2001 (EPA, 2001), is under review following significant public comments. EPA headquarters is not recommending that the proposed slope factor be used in risk assessments, and has requested that the U.S. National Academy of Sciences conduct a review of the August 2001 risk assessment. A revised risk assessment is expected in 2006. EPA Regions IV and VIII are also not recommending the use of the TCE provisional slope factor. Region IV has endorsed the use of the Cal-EPA slope factor in the interim until new guidance is provided. Region VIII recommends use of the old EPA slope factor, which was withdrawn from IRIS in 1989. The Cal-EPA slope factor is approximately 2-fold more conservative than the withdrawn slope factor, and is considered to be a technically credible value (Cal-EPA, 2002).

The slope factor for PCE also has been withdrawn from IRIS. Until EPA updates the toxicity values for PCE, the agency recommends using the values published by Cal-EPA (Cal-EPA, 2002) as the best value available at this time until a U.S. EPA value becomes available (EPA, 2003).

Table 3
Calculation of Risk-Based Concentrations

Chemical	Inhalation Slope Factor (kg-day/mg)	Inhalation RfD (mg/kg-day)	Screening Levels in Air (ug/m3)			Final Screening Level in Air (ug/m3)	Final Screening Level in Air (ppbv)
			Carcinogenic	Non-Carcinogenic	Lowest Value		
Cis-1,2-Dichloroethene		1.00E-02		1.14E+02	1.14E+02	1.14E+02	29
Methylene Chloride	1.65E-03	8.57E-01	1.93E+03	9.73E+03	1.93E+03	1.93E+03	560
Tetrachloroethene	1.00E-02	1.71E-01	3.18E+02	1.94E+03	3.18E+02	3.18E+02	47
Trichloroethene	7.00E-03		4.54E+02		4.54E+02	4.54E+02	84
Vinyl Chloride	1.54E-02	2.86E-02	2.06E+02	3.25E+02	2.06E+02	2.06E+02	81

Input Factors	
Exposure Parameters	Value
Target Cancer Risk	1E-04
Target Hazard Quotient	1.0
Body Weight, Adult (kg)	70
Air Breathed (m3/hr)	1.00
Exposure Time (hr/day)	9
Exposure Frequency (d/yr)	250
Exposure Duration (yr)	25.0
Average Time – Carcinogenic (yr)	70
Average Time – Noncarcinogenic (yr)	25.0

Notes:

Toxicity values for cis-1,2-dichloroethene, methylene chloride and vinyl chloride were obtained from EPA's IRIS (Integrated Risk Information System) database or HEAST (Health Effects Assessment Summary Tables) document.

Toxicity values for tetrachloroethene and trichloroethene were obtained from California Environmental Protection Agency's (Cal-EPA) Office of Environmental Health and Hazards Assessment (OEHHA) database.

Conversion from ug/m³ to ppbv is based on standard conditions (760 mm Hg and 25 deg C).

5 Conclusions

Concentrations of VOCs detected in indoor air samples from the Modine facility were well below the lowest available occupational exposure level. Concentrations of the five COCs found during the IAQ assessment were all less than 1% of the lowest occupational exposure limit. The concentrations in indoor air at the facility also fall below the calculated comparative screening levels for workers in an industrial setting. Table 4 provides a comparison of the VOCs detected versus both published occupational exposure limits and risk-based screening levels based on a worker exposure scenario.

Based on the comparison of measured concentrations to the most conservative occupational exposure limits and the calculated risk-based screening levels for workers in an industrial setting, there are no "unacceptable human exposures to contamination (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)". Therefore, the Camdenton facility achieves compliance with the Human Exposure Under Control Environmental Indicator (EI) and Modine has completed all requirements under the Administrative Order related to this issue.

The risk posed by the cumulative effect of the chemicals detected was also evaluated as shown in Table 5. Table 5 presents the result obtained from the sampling, a calculated excess lifetime cancer risk for each COC detected in each sample, and cumulative risks based on COCs measured at each sampling location. That evaluation shows that cumulative risks at all sample locations fall below the 1×10^{-4} cancer risk level and Target Hazard Quotient of 1.0 used for screening in this study.

The VOC concentrations found in the sample collected from outside the Camdenton facility are consistent with ambient background concentrations found in other parts of the country. Documented background TCE concentrations have been measured as high as 0.2 ppbv.

Table 4
Comparison Table

Field ID	Description	Analytical Method	Analyte	Result (ppbv)	Lab Q	Screening Level (ppbv)	Occupational Exposure Limit (ppbv)
MD-AS-01	Office wing conference room	TO14	Methylene chloride	1.13		560	25,000
		TO14-SIM	Tetrachloroethene	0.2		47	25,000
		TO14	Trichloroethene	14.6		84	50,000
MD-AS-02	Office wing restroom sink area	TO14	cis-1,2-Dichloroethene	0.88	J	29	200,000
		TO14	Methylene chloride	0.64	J	560	25,000
		TO14-SIM	Tetrachloroethene	0.517		47	25,000
		TO14	Trichloroethene	61.5		84	50,000
MD-AS-03	NE plant corner	TO14-SIM	Tetrachloroethene	0.578		47	25,000
		TO14	Trichloroethene	46.7		84	50,000
MD-AS-04	Training room near chem. storage area	TO14-SIM	Tetrachloroethene	0.443		47	25,000
		TO14	Trichloroethene	56.5		84	50,000
		TO14-SIM	Vinyl chloride	0.009		81	1,000
MD-AS-05	Center of plant near welding bays	TO14-SIM	Tetrachloroethene	0.602		47	25,000
		TO14	Trichloroethene	42.2		84	50,000
		TO14-SIM	Vinyl chloride	0.015		81	1,000
MD-AS-06	S end of plant in historical degreaser location	TO14	cis-1,2-Dichloroethene	0.62	J	29	200,000
		TO14	Methylene chloride	0.81	J	560	25,000
		TO14-SIM	Tetrachloroethene	0.528		47	25,000
		TO14	Trichloroethene	34.6		84	50,000
MD-AS-07	OUTSIDE SAMPLE	TO14-SIM	Tetrachloroethene	0.053		47	25,000
		TO14-SIM	Trichloroethene	0.204		84	50,000
MD-AS-08	Duplicate of MD-AS-05	TO14-SIM	Tetrachloroethene	0.582		47	25,000
		TO14	Trichloroethene	42.7		84	50,000
		TO14-SIM	Vinyl chloride	0.015		81	1,000
MD-AS-B1	Blank	TO14-SIM	Trichloroethene	0.025		84	50,000

Notes:

J = The analyte was positively identified but the reported value is estimated.

Screening Level - Based on MDNR recommended modifications of 10-4 Target Cancer Risk and 9 hr/day exposure time, rounded to two significant digits.

Occupational Exposure Limit value is the lowest of the OSHA PEL, ACGIH TLV or NIOSH REL.

OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit

ACGIH TLV = American Council of Governmental Hygienists Threshold Exposure Limit

NIOSH REL = National Institute for Occupational Safety and Health Recommended Exposure Limits

Table 5
Evaluation of Cumulative Risks

Field ID	Description	Analyte	Result (ppbv)	Screening Level (ppbv)	Excess Lifetime Cancer Risk	Total Risk
MD-AS-01	Office wing conference room	Methylene chloride	1.13	560	2.0E-07	1.8E-05
		Tetrachloroethene	0.2	47	4.3E-07	
		Trichloroethene	14.6	84	1.7E-05	
MD-AS-02	Office wing restroom sink area	cis-1,2-Dichloroethene	0.88	29	NA	7.4E-05
		Methylene chloride	0.64	560	1.2E-07	
		Tetrachloroethene	0.517	47	1.1E-06	
		Trichloroethene	61.5	84	7.3E-05	
MD-AS-03	NE plant corner	Tetrachloroethene	0.578	47	1.2E-06	5.6E-05
		Trichloroethene	46.7	84	5.5E-05	
MD-AS-04	Training room near chem. storage area	Tetrachloroethene	0.443	47	9.5E-07	6.8E-05
		Trichloroethene	56.5	84	6.7E-05	
		Vinyl chloride	0.009	81	1.1E-08	
MD-AS-05	Center of plant near welding bays	Tetrachloroethene	0.602	47	1.3E-06	5.1E-05
		Trichloroethene	42.2	84	5.0E-05	
		Vinyl chloride	0.015	81	1.9E-08	
MD-AS-06	S end of plant in historical degreaser location	cis-1,2-Dichloroethene	0.62	29	NA	4.2E-05
		Methylene chloride	0.81	560	1.5E-07	
		Tetrachloroethene	0.528	47	1.1E-06	
		Trichloroethene	34.6	84	4.1E-05	
MD-AS-07	OUTSIDE SAMPLE	Tetrachloroethene	0.053	47	1.13E-07	3.54E-07
		Trichloroethene	0.204	84	2.41E-07	
MD-AS-08	Duplicate of MD-AS-05	Tetrachloroethene	0.582	47	1.2E-06	5.2E-05
		Trichloroethene	42.7	84	5.1E-05	
		Vinyl chloride	0.015	81	1.9E-08	
MD-AS-B1	Blank	Trichloroethene	0.025			

Note:

Excess lifetime cancer risks not calculated for cis-1,2-dichloroethene because it is evaluated as a non-carcinogen. The screening level for cis-1,2-dichloroethene corresponds to a non-cancer hazard quotient of one. Concentrations less than the screening level are not associated with non-cancer health effects in humans.

SECTION 6

6 Methods for Assuring Environmental Indicator for Human Exposure Under Control

Concentrations of VOCs detected indoors in a workplace setting will be addressed as part of the Camdenton facility's occupational safety and health program regulated under OSHA, in accordance with EPA's draft vapor intrusion guidance.

Based on the findings, there is no unacceptable human exposure to contamination for workers within the facility. However, in response to the VOCs measured during the IAQ assessment, Modine has taken the following steps to ensure that potential future exposure of workers to these VOCs in indoor air remains controlled:

- Add the five constituents to the existing Hazard Communication Program and notify workers about these findings, and
- Add the five constituents to the existing annual exposure monitoring program and collect air samples and analyze them for these constituents.

6.1 Annual Health & Safety Monitoring Air Sampling

Indoor Air Sampling was conducted by Modine as part of ongoing Health and Safety program activities at the plant in August 2003. Annually, personnel monitoring is conducted for the constituents identified in the facility's Hazard Communication Program (HCP). The HCP was revised at the Camdenton facility to incorporate the five COCs that were detected in the March 2003 IAQ assessment. (If, after three years of monitoring, concentrations have not been observed above OSHA standards the annual monitoring requirement for these constituents will be discontinued.)

The monitoring consisted of two area samples collected from stationary locations in the western portion of the plant. Samples were collected in accordance with NIOSH sampling methods by drawing air through charcoal sorbent tubes with personal sampling pumps calibrated to sample at a flow rate of 0.34 Liters/minute. NIOSH analytical methods (Methods 1003, 1005, 1007, and 1022) were used to analyze for the five COCs incorporated into the HCP.

6.2 Annual Health & Safety Monitoring Sampling Results

The NIOSH method analytical results from the occupational air quality sampling at the Camdenton facility are presented in Appendix D. A total of four samples were collected over an approximate 8-hour period. Samples were collected from the from the north end of

the paint area and at the turret press at the west end of the welding area (Figure 2). One sample was collected from each location on successive days (August 11 and 12, 2003).

Concentrations for all five COCs (TCE, PCE, cis-1,2-DCE, vinyl chloride, and methylene chloride) were below NIOSH method detection limits.

SECTION 7

7 References

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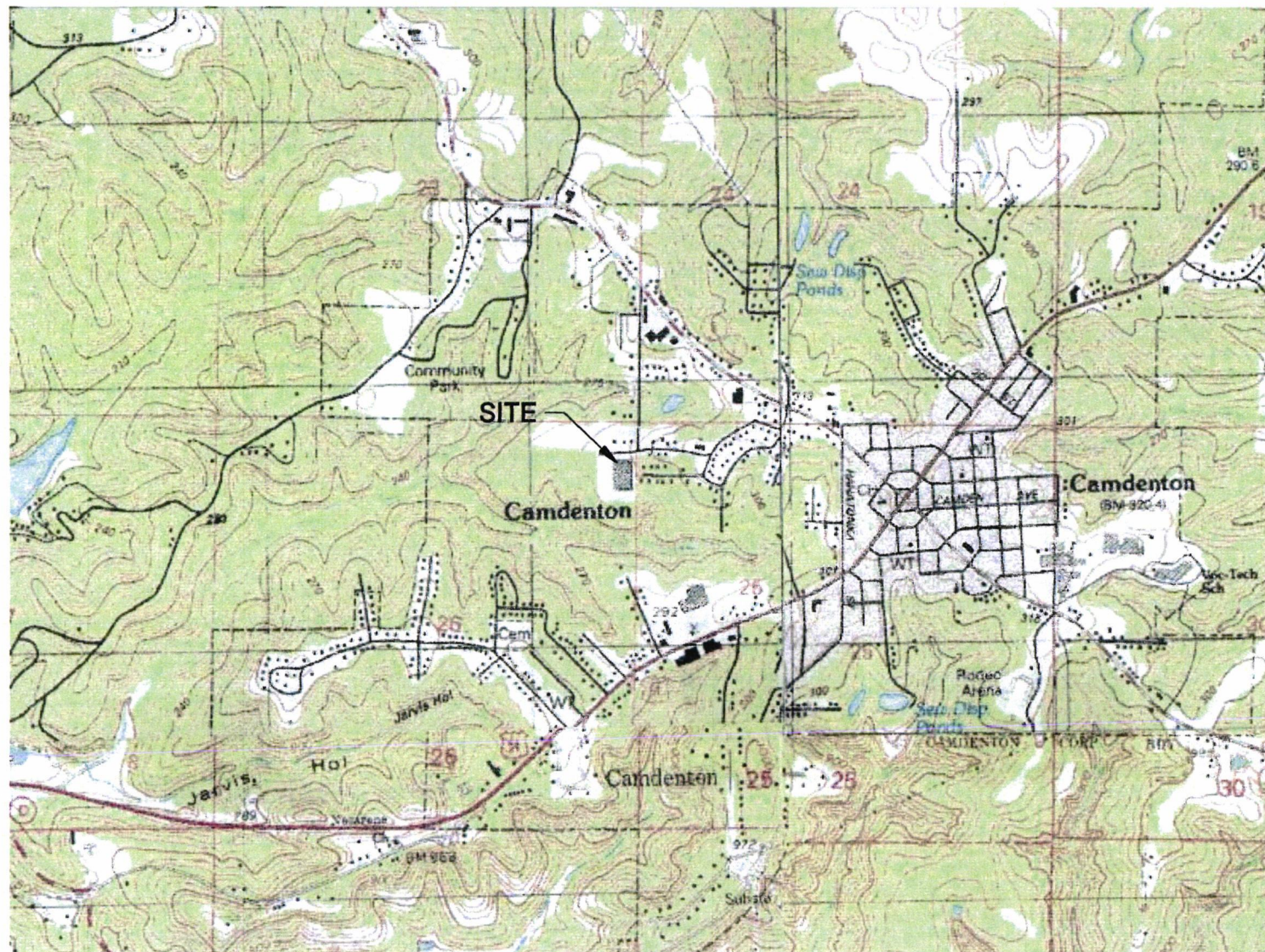
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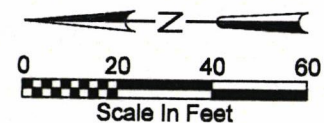
FIGURES



NOT TO SCALE

FIGURE 1
SITE LOCATION MAP
TECHNICAL MEMORANDUM
MODINE MANUFACTURING COMPANY
CAMDENTON, MISSOURI

CH2MHILL



- LEGEND**
- HISTORICAL MONORAIL DEGREASER LOCATION
 - OVEN
 - MD-AS-02 AIR SAMPLING CANISTER LOCATION
 - C-1 NIOSH METHOD AIR SAMPLING LOCATION

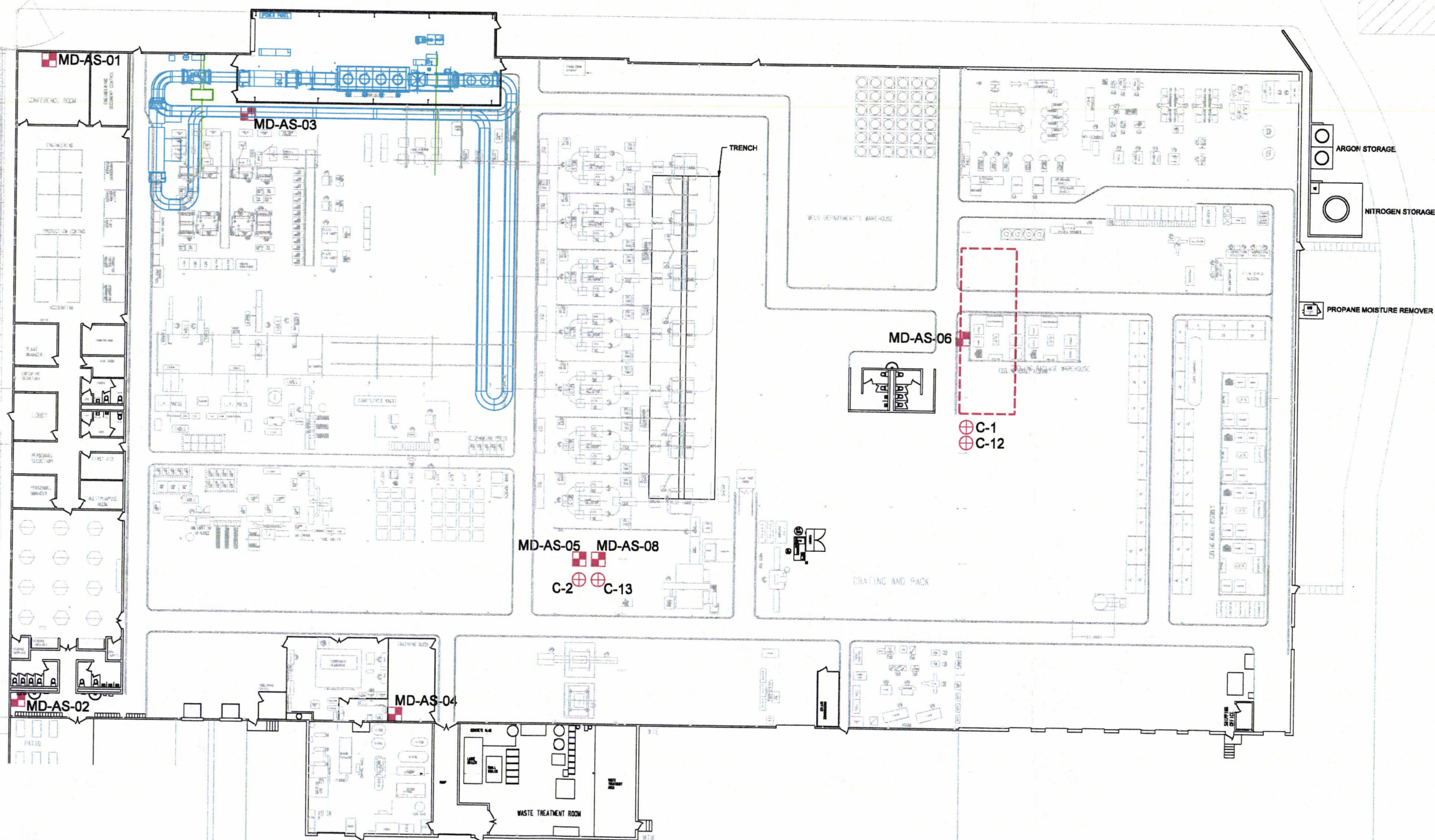


FIGURE 2
INDOOR AIR SAMPLING LOCATIONS
MODINE MANUFACTURING COMPANY
CAMDENTON, MISSOURI
APRIL 2003

CH2MHILL

APPENDIX A
CH2M HILL Standard Operating Procedure for Canister Integrated
Sampling

TO-14/15 (canister) Integrated Ambient Air Sampling Method

1 Scope and Application

- 1.1 This sampling method describes the procedure for collecting ambient air samples for volatile organic compounds.

2 Summary of Method

- 2.1 A sample of ambient air is withdrawn from the sample location into a precleaned and evacuated canister by virtue of a flow controller. Sample collection can be integrated over time by adjusting the flow controller. Sample periods as short as 10 minutes to as long as 24 hours can be achieved based on the size of canister used and the sampling rate selected.

3 Apparatus and Materials

- 3.1 Canister, summa polished, precleaned, and evacuated
- 3.2 Flow controller, precleaned, and set at desired sampling rate
- 3.3 Shipping container, suitable for protection and canister during shipping.
- 3.4 Wrenches and screw driver, various sizes as needed for connecting fittings and making adjustment to the flow controller
- 3.5 Bubble flow meter or equivalent, used in the adjustment of the flow controller
- 3.6 Negative Pressure Gauge, either installed on the canister or used externally to check canister pressure.

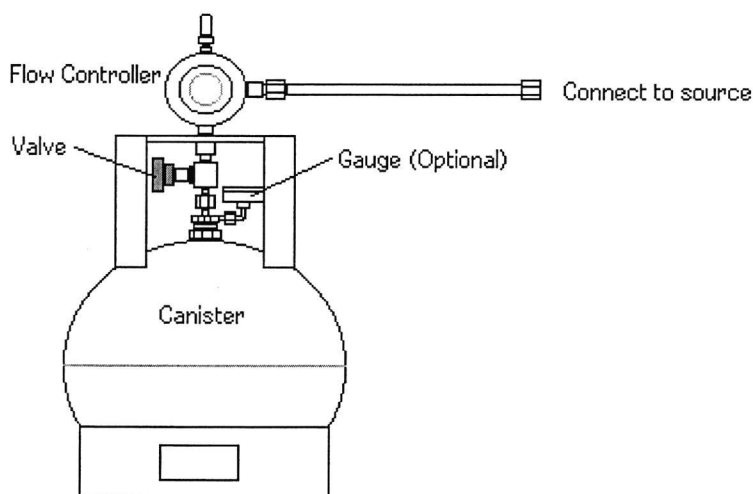
4 Procedure

- 4.1 Inspect the canister for damage. Do not use a canister that has visible damage. Verify that the vacuum pressure of the canister is equal to that indicated on the laboratory's evacuation tag. Do not use a canister that has leaked.
- 4.2 Verify that the flow controller is set at the desired sampling rate. If not pre-set, see the appropriate SOP for flow controller adjustment.
- 4.3 Remove the protective cap from the valve on the canister.
- 4.4 If using an external gauge, attach the gauge to the canister and open the valve. After taking the reading, close the canister and remove the gauge.
- 4.5 In the field log record the canister ID, initial vacuum, desired flowrate, and all sample location information.
- 4.6 Connect the flow controller to the canister. The flow controller fitting denoted "LP" or "OUT" is connected to the canister. Tighten the fitting as to leak free but do not over tighten.
- 4.7 To begin sampling, slowly open the canister valve at least one full turn or more.
- 4.8 For canisters with built in pressure gauges, monitor the vacuum pressure change several times during the course of the selected sample period to ensure the canister is being filled.
- 4.9 At the end of the sample period, close the canister valve finger tight.
- 4.10 Remove the flow controller and replace the protective cap on the canister valve fitting.
- 4.11 If using an external gauge, re-attach it, open the valve, and record the pressure. Then close the valve, remove the gauge, and replace the protective cap.
- 4.12 If the flow controller is going to be used for more than one sample collection, be sure to purge it between uses. To do this, attach the flow controller to a vacuum source and draw clean air or sample gas through it for several minutes before attaching it to the canister.
- 4.13 Fill out all appropriate documentation (chain of custody, sample tags) and return canisters and all equipment to the laboratory in the shipping containers provided.
- 4.14 When packing the canisters for shipment, verify that the valve caps are snug (1/4 turn past finger tight), and use sufficient packing to prevent the valves from rubbing against any hard surfaces.
- 4.15 Please do not place sticky labels or tape on any surface of the canister!

5 Quality Control

- 5.1 Canister supplied by the laboratory must follow the performance criteria and quality assurance prescribe in US EPA Method TO-14 for canister cleaning, certification of cleanliness, and leak checking. Standard operating procedures are required.
- 5.2 Flow controllers supplied by the laboratory must follow the performance criteria and quality assurance prescribed in US EPA Method TO-14 for flow controller cleaning and adjustment. Standard operating procedures are required.

FIGURE 1
Assembled Canister Sampler for Integrated Sample Collection



Return to:
CH2M HILL

Applied Sciences Laboratory—Sample Receiving
2300 NW Walnut Boulevard
Corvallis, OR 97330-3538

If you have any questions, please call Customer Services at (541) 758-0235, ext. 3120.

APPENDIX B
Canister Certifications

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 502

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT17

Analysis Mode: SIM

Lab File ID: CERT17.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/14/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 529

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT9Analysis Mode: SIMLab File ID: CERT9.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 02/15/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO.	COMPOUND	PPTV	Q
75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

9

LAB CANISTER ID

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 544

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT4

Analysis Mode: SIM

Lab File ID: CERT4.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 02/15/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO.	COMPOUND	PPTV	Q
75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 546

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT16

Analysis Mode: SIM

Lab File ID: CERT16.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 558

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT3Analysis Mode: SIMLab File ID: CERT3.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/12/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 571

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT2Analysis Mode: SIMLab File ID: CERT2.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 584

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT18

Analysis Mode: SIM

Lab File ID: CERT18.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/14/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 607

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT3

Analysis Mode: SIM

Lab File ID: CERT3.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 02/27/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 655

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT19

Analysis Mode: SIM

Lab File ID: CERT19.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/14/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 182

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT9

Analysis Mode: SIM

Lab File ID: CERT9.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO.	COMPOUND	PPTV	Q
75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 222

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT2

Analysis Mode: SIM

Lab File ID: CERT2.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/14/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 231

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT14Analysis Mode: SIMLab File ID: CERT14.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 235

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT13

Analysis Mode: SIM

Lab File ID: CERT13.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 238

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT15Analysis Mode: SIMLab File ID: CERT15.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 253

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT7Analysis Mode: SIMLab File ID: CERT7.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO.	COMPOUND	PPTV	Q
75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 254

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT10

Analysis Mode: SIM

Lab File ID: CERT10.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 255

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT8Analysis Mode: SIMLab File ID: CERT8.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

APPENDIX C
Laboratory Analytical Results and Chain of Custody



CH2M HILL
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

April 10, 2003

Modine

179143.AS.01

RE: Laboratory Report for Modine
Applied Sciences Group Reference No. 9040

Dan Price/STL:

On March 21, 2003, CH2M HILL Applied Sciences Group received nine samples with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. This data package meets standards requested by client and is not intended or implied to meet any other standard.

CH2M HILL Applied Sciences Group appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Ben Thompson at (541) 758-0235, extension 3132.

Sincerely,

A handwritten signature in black ink that reads "Ben Thompson". The signature is fluid and cursive, with the first and last names clearly legible.

Ben Thompson
Analytical Manager

Enclosures

TO-14A

CASE NARRATIVE
VOLATILE ORGANIC ANALYSIS

CLIENT/PROJECT: Modine

ANALYTICAL METHOD: TO-14A

LABORATORY: CH2M HILL Applied Sciences Lab

PROJECT NO.: 179143.AS.01

LAB CODE: CVO

LAB BATCH NO.: 9040

I. RECEIPT

A. Date: March 21, 2003

B. Sample Information

LAB SAMPLE ID	CLIENT SAMPLE ID	CANISTER ID	SAMPLE MATRIX	DATE SAMPLED	TIME SAMPLED	RECEIVED PRESS. (torr)
904001	MD-AS-01	529	Air	03/19/2003	10:33	729
904002	MD-AS-02	655	Air	03/19/2003	10:38	703
904003	MD-AS-03	558	Air	03/19/2003	10:52	282
904004	MD-AS-04	607	Air	03/19/2003	10:54	598
904005	MD-AS-05	584	Air	03/19/2003	11:07	515
904006	MD-AS-06	571	Air	03/19/2003	11:22	717
904007	MD-AS-07	544	Air	03/19/2003	11:37	756
904008	MD-AS-08	502	Air	03/19/2003	11:07	382
904009	MD-AS-B1	546	Air	03/19/2003	11:45	0

II. Holding Times:
All acceptance criteria were met.

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Instrument Performance Check:
All acceptance criteria were met.

E. Surrogate Recoveries:
All acceptance criteria were met.

F. Internal Standards:
All acceptance criteria were met.

G. Laboratory Control Sample (LCS)
All acceptance criteria were met.

H. Matrix Spike(MS)/Matrix Spike Duplicate(MSD)
Not applicable.

I. Analytical Exception:
None.

J. Other:
None

IV. Sampling Equipment Exceptions:
None.

V. Documentation Exceptions:
None.

VI. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

SIGNED: Ginger Collins
Ginger Collins
Analytical Chemist

DATE: 4/8/03

REVIEWED: Ben Thompson
Ben Thompson
Organics Supervisor

DATE: 4/9/03

**SAMPLE DATA
SUMMARY**

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-01

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904001

Level: (low/med) LOW

Lab File ID: 904001.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	1.1	
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	14.6	
127-18-4	Tetrachloroethene	1.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-02

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904002

Level: (low/med) LOW

Lab File ID: 904002.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	0.6	J
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	0.9	J
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	61.5	
127-18-4	Tetrachloroethene	1.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-03

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904003

Level: (low/med) LOW

Lab File ID: 904003R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 5

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	4.5	U
75-35-4	1,1-Dichloroethene	4.5	U
75-09-2	Methylene chloride	4.5	U
75-34-3	1,1-Dichloroethane	4.5	U
156-59-2	cis-1,2-Dichloroethene	4.5	U
71-55-6	1,1,1-Trichloroethane	4.5	U
79-01-6	Trichloroethene	46.7	
127-18-4	Tetrachloroethene	4.5	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-04

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904004

Level: (low/med) LOW

Lab File ID: 904004R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 2

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	2.0	U
75-35-4	1,1-Dichloroethene	2.0	U
75-09-2	Methylene chloride	2.0	U
75-34-3	1,1-Dichloroethane	2.0	U
156-59-2	cis-1,2-Dichloroethene	2.0	U
71-55-6	1,1,1-Trichloroethane	2.0	U
79-01-6	Trichloroethene	56.5	
127-18-4	Tetrachloroethene	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904005

Level: (low/med) LOW

Lab File ID: 904005R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 2

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	2.3	U
75-35-4	1,1-Dichloroethene	2.3	U
75-09-2	Methylene chloride	2.3	U
75-34-3	1,1-Dichloroethane	2.3	U
156-59-2	cis-1,2-Dichloroethene	2.3	U
71-55-6	1,1,1-Trichloroethane	2.3	U
79-01-6	Trichloroethene	42.2	
127-18-4	Tetrachloroethene	2.3	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05DUP

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904005D

Level: (low/med) LOW Lab File ID: 904005D.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 2

CONCENTRATION UNITS:

CAS NO.	COMPOUND	PPBV	Q
75-01-4	Vinyl chloride	2.3	U
75-35-4	1,1-Dichloroethene	2.3	U
75-09-2	Methylene chloride	2.3	U
75-34-3	1,1-Dichloroethane	2.3	U
156-59-2	cis-1,2-Dichloroethene	2.3	U
71-55-6	1,1,1-Trichloroethane	2.3	U
79-01-6	Trichloroethene	43.4	
127-18-4	Tetrachloroethene	2.3	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-06

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904006

Level: (low/med) LOW

Lab File ID: 904006.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	0.8	J
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	0.6	J
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	34.6	
127-18-4	Tetrachloroethene	1.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-07

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904007

Level: (low/med) LOW

Lab File ID: 904007.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	1.0	U
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
127-18-4	Tetrachloroethene	1.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-08

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904008

Level: (low/med) LOW Lab File ID: 904008R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 3

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	2.9	U
75-35-4	1,1-Dichloroethene	2.9	U
75-09-2	Methylene chloride	2.9	U
75-34-3	1,1-Dichloroethane	2.9	U
156-59-2	cis-1,2-Dichloroethene	2.9	U
71-55-6	1,1,1-Trichloroethane	2.9	U
79-01-6	Trichloroethene	42.7	
127-18-4	Tetrachloroethene	2.9	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-B1

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904009

Level: (low/med) LOW Lab File ID: 904009R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	1.0	U
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
127-18-4	Tetrachloroethene	1.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B1_0324

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: B1_0324

Level: (low/med) LOW

Lab File ID: B1_0324.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: NA

Date Analyzed: 03/24/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	0.9	J
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
127-18-4	Tetrachloroethene	1.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB1_0325

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB1_0325

Level: (low/med) LOW

Lab File ID: XB1_0325.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	0.6	J
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
127-18-4	Tetrachloroethene	1.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB2_0328

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB2_0328

Level: (low/med) LOW

Lab File ID: XB2_0328.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

75-01-4	Vinyl chloride	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
75-09-2	Methylene chloride	0.9	J
75-34-3	1,1-Dichloroethane	1.0	U
156-59-2	cis-1,2-Dichloroethene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
127-18-4	Tetrachloroethene	1.0	U

QC SUMMARY

2A
VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

	EPA SAMPLE NO.	SMC1 #	SMC2 #	TOT OUT
01	B1_0324	98	91	0
02	XB1_0325	98	94	0
03	MD-AS-01	100	96	0
04	MD-AS-02	97	94	0
05	MD-AS-06	99	95	0
06	MD-AS-07	98	92	0
07	XB2_0328	91	86	0
08	MD-AS-B1	98	89	0
09	MD-AS-03	101	92	0
10	MD-AS-04	99	88	0
11	MD-AS-05	100	93	0
12	MD-AS-05DUP	100	92	0
13	MD-AS-08	102	90	0

SMC1 = Toluene-d8
 SMC2 = Bromofluorobenzene

QC LIMITS
 (70-130)
 (70-130)

Column to be used to flag recovery values
 * Values outside of contract required QC limits
 D System Monitoring Compound diluted out

3
 DUPLICATES
 VOLATILE ORGANIC ANALYSIS

Lab Name: Applied Sciences Laboratory
 Lab Code: CVO
 Lab File ID: C:\HPCHEM\1\DATA\032803G1\904005R.D
 Lab File ID: C:\HPCHEM\1\DATA\032803G1\904005D.D
 Instrument ID: GODZILLA
 GC Column: DB-VRX 0.25mm x 60 meters

Project No.: 179143.AS.01
 Lab Batch No.: 9040
 Lab Sample ID: 904005
 Date Analyzed: 03/29/03
 Concentration Units: ppbv

ANALYTE	CONTROL LIMIT	SAMPLE	DUPLICATE	RPD (%)
Vinyl chloride	± 30	2.3 U	2.3 U	--
1,1-Dichloroethene	± 30	2.3 U	2.3 U	--
Methylene chloride	± 30	2.3 U	2.3 U	--
1,1-Dichloroethane	± 30	2.3 U	2.3 U	--
cis-1,2-Dichloroethene	± 30	2.3 U	2.3 U	--
1,1,1-Trichloroethane	± 30	2.3 U	2.3 U	--
Trichloroethene	± 30	42.2	43.4	2.8
Tetrachloroethene	± 30	2.3 U	2.3 U	--

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

B1_0324

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
Lab File ID: B1_0324.D Lab Sample ID: B1_0324
Date Analyzed: 03/24/03 Time Analyzed: 12:51
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	1 PPBV STD	LEVEL1	LEVEL1.D	13:33
02	5 PPBV STD	LEVEL2	LEVEL2.D	14:37
03	10 PPBV STD	LEVEL3	LEVEL3.D	15:16
04	20 PPBV STD	LEVEL4	LEVEL4.D	15:57
05	50 PPBV STD	LEVEL5	LEVEL5.D	16:36
06	100 PPBV STD	LEVEL6	LEVEL6.D	17:15

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB1_0325

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Lab File ID: XB1_0325.D Lab Sample ID: XB1_0325

Date Analyzed: 03/25/03 Time Analyzed: 11:12

GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	CV2_0325	CV2_0325	CV2_0325.D	09:02
02	MD-AS-01	904001	904001.D	19:51
03	MD-AS-02	904002	904002.D	20:47
04	MD-AS-06	904006	904006.D	21:42
05	MD-AS-07	904007	904007.D	22:35

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB2_0328

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
Lab File ID: XB2_0328.D Lab Sample ID: XB2_0328
Date Analyzed: 03/28/03 Time Analyzed: 09:33
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	CV3_0328	CV3_0328	CV3_0328.D	15:54
02	MD-AS-B1	904009	904009R.D	04:09
03	MD-AS-03	904003	904003R.D	04:54
04	MD-AS-04	904004	904004R.D	05:39
05	MD-AS-05	904005	904005R.D	06:24
06	MD-AS-05DUP	904005D	904005D.D	07:10
07	MD-AS-08	904008	904008R.D	07:57

COMMENTS:

5A
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID: T1_0324.D BFB Injection Date: 03/24/03
 Instrument ID: GC/MS - G BFB Injection Time: 12:51
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.1
75	30.0 - 60.0% of mass 95	41.1
95	Base peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.6
173	Less than 2.0% of mass 174	0.0
174	50.0 - 100.0% of mass 95	86.4
175	5.0 - 9.0% of mass 174	7.9
176	95.0 - 101.0% of mass 174	98.1
177	5.0 - 9.0% of mass 176	5.7

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	B1_0324	B1_0324	B1_0324.D	03/24/03	12:51
02	1 PPBV STD	LEVEL1	LEVEL1.D	03/24/03	13:33
03	5 PPBV STD	LEVEL2	LEVEL2.D	03/24/03	14:37
04	10 PPBV STD	LEVEL3	LEVEL3.D	03/24/03	15:16
05	20 PPBV STD	LEVEL4	LEVEL4.D	03/24/03	15:57
06	50 PPBV STD	LEVEL5	LEVEL5.D	03/24/03	16:36
07	100 PPBV STD	LEVEL6	LEVEL6.D	03/24/03	17:15

5A
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID: T2_0325.D BFB Injection Date: 03/25/03
 Instrument ID: GC/MS - G BFB Injection Time: 09:02
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	16.8
75	30.0 - 60.0% of mass 95	39.8
95	Base peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	8.0
173	Less than 2.0% of mass 174	0.0
174	50.0 - 100.0% of mass 95	85.3
175	5.0 - 9.0% of mass 174	7.7
176	95.0 - 101.0% of mass 174	95.3
177	5.0 - 9.0% of mass 176	6.8

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	CV2_0325	CV2_0325	CV2_0325.D	03/25/03	09:02
02	XB1_0325	XB1_0325	XB1_0325.D	03/25/03	11:12
03	MD-AS-01	904001	904001.D	03/25/03	19:51
04	MD-AS-02	904002	904002.D	03/25/03	20:47
05	MD-AS-06	904006	904006.D	03/25/03	21:42
06	MD-AS-07	904007	904007.D	03/25/03	22:35

5A
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID: T2_0328.D BFB Injection Date: 03/28/03
 Instrument ID: GC/MS - G BFB Injection Time: 09:33
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.5
75	30.0 - 60.0% of mass 95	42.2
95	Base peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.7
173	Less than 2.0% of mass 174	0.0
174	50.0 - 100.0% of mass 95	90.1
175	5.0 - 9.0% of mass 174	6.5
176	95.0 - 101.0% of mass 174	96.6
177	5.0 - 9.0% of mass 176	6.8

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	XB2_0328	XB2_0328	XB2_0328.D	03/28/03	09:33
02	CV3_0328	CV3_0328	CV3_0328.D	03/28/03	15:54
03	MD-AS-B1	904009	904009R.D	03/29/03	04:09
04	MD-AS-03	904003	904003R.D	03/29/03	04:54
05	MD-AS-04	904004	904004R.D	03/29/03	05:39
06	MD-AS-05	904005	904005R.D	03/29/03	06:24
07	MD-AS-05DUP	904005D	904005D.D	03/29/03	07:10
08	MD-AS-08	904008	904008R.D	03/29/03	07:57

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date(s): 03/24/03 03/24/03
 Heated Purge (Y/N): N Calibration Times: 13:33 17:15
 GC Column: DB-VRX ID: 0.25 (mm)

LAB FILE ID: RRF1 = LEVEL1.D RRF2 = LEVEL2.D RRF3 = LEVEL3.D
 RRF4 = LEVEL4.D RRF5 = LEVEL5.D RRF6 = LEVEL6.D

COMPOUND	RRF1	RRF2	RRF3	RRF4	RRF5	RRF6	<u>RRF</u>	% RSD
Vinyl chloride	1.089	1.027	1.226	1.376	1.275	1.176	1.195	10.6
1,1-Dichloroethene	1.964	2.121	2.227	2.490	2.246	2.048	2.183	8.5
Methylene chloride	2.563	1.543	1.597	1.779	1.563	1.430	1.746	23.8
1,1-Dichloroethane	1.854	2.052	2.195	2.564	2.293	1.830	2.131	13.1
cis-1,2-Dichloroethene	1.362	1.541	1.661	1.934	1.752	1.450	1.617	13.0
1,1,1-Trichloroethane	1.809	2.150	2.253	2.638	2.443	2.163	2.243	12.6
Trichloroethene	0.358	0.421	0.440	0.502	0.434	0.390	0.424	11.5
Tetrachloroethene	0.170	0.187	0.203	0.223	0.186	0.158	0.188	12.4
Toluene-d8	0.865	0.876	0.904	0.869	0.869	0.876	0.876	1.6
Bromofluorobenzene	0.159	0.166	0.166	0.168	0.178	0.206	0.174	9.7

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date: 03/25/03 Time: 09:02
 Lab File ID: CV2_0325.D Init. Calib. Date(s): 03/24/03 03/24/03
 Heated Purge: (Y/N) N Init. Calib. Times: 13:33 17:15
 GC Column: DB-VRX ID: 0.25 (mm)

COMPOUND	RRF	RRF4	% D	MAX % D
Vinyl chloride	1.195	1.272	-6.5	30
1,1-Dichloroethene	2.183	2.184	0.0	30
Methylene chloride	1.746	1.499	14.2	30
1,1-Dichloroethane	2.131	1.987	6.8	30
cis-1,2-Dichloroethene	1.617	1.560	3.5	30
1,1,1-Trichloroethane	2.243	2.219	1.1	30
Trichloroethene	0.424	0.444	-4.6	30
Tetrachloroethene	0.188	0.181	3.8	30
Toluene-d8	0.876	0.828	5.6	30
Bromofluorobenzene	0.174	0.174	-0.3	30

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date: 03/28/03 Time: 15:54
 Lab File ID: CV3_0328.D Init. Calib. Date(s): 03/24/03 03/24/03
 Heated Purge: (Y/N) N Init. Calib. Times: 13:33 17:15
 GC Column: DB-VRX ID: 0.25 (mm)

COMPOUND	RRF	RRF4		% D	MAX % D
Vinyl chloride	1.195	1.175		1.6	30
1,1-Dichloroethene	2.183	2.102		3.7	30
Methylene chloride	1.746	1.407		19.4	30
1,1-Dichloroethane	2.131	2.138		-0.3	30
cis-1,2-Dichloroethene	1.617	1.587		1.8	30
1,1,1-Trichloroethane	2.243	2.199		2.0	30
Trichloroethene	0.424	0.437		-3.1	30
Tetrachloroethene	0.188	0.192		-2.4	30
Toluene-d8	0.876	0.862		1.6	30
Bromofluorobenzene	0.174	0.164		5.6	30

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID (Standard): CV2_0325.D Date Analyzed: 03/25/03
 Instrument ID: GC/MS - G Time Analyzed: 09:02
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

	IS1 AREA #	RT #	IS2 AREA #	RT #	IS3 AREA #	RT #
24 HOUR STD	67845	13.57	299605	16.04	81745	20.53
UPPER LIMIT	94983	14.07	419447	16.54	114443	21.03
LOWER LIMIT	40707	13.07	179763	15.54	49047	20.03
EPA SAMPLE NO.						
01 XB1_0325	65071	13.68	284758	16.12	85229	20.58
02 MD-AS-01	59508	13.54	253930	15.99	76016	20.46
03 MD-AS-02	63951	13.58	272557	16.03	84136	20.53
04 MD-AS-06	65623	13.56	285559	16.01	84903	20.49
05 MD-AS-07	68945	13.60	289347	16.02	85904	20.51
06 XB2_0328	61854	13.68	270902	16.12	74558	20.58

IS1 = Bromochloromethane
 IS2 = 1,4-Difluorobenzene
 IS3 = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area
 AREA LOWER LIMIT = - 40% of internal standard area
 RT UPPER LIMIT = +0.50 minutes of internal standard RT
 RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID (Standard): CV3_0328.D Date Analyzed: 03/28/03
 Instrument ID: GC/MS - G Time Analyzed: 15:54
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

	IS1 AREA #	RT #	IS2 AREA #	RT #	IS3 AREA #	RT #
24 HOUR STD	63377	13.64	272250	16.07	80337	20.57
UPPER LIMIT	88728	14.14	381150	16.57	112472	21.07
LOWER LIMIT	38026	13.14	163350	15.57	48202	20.07
EPA SAMPLE NO.						
01 MD-AS-B1	63512	13.65	279211	16.08	80524	20.57
02 MD-AS-03	63489	13.65	274232	16.10	82335	20.57
03 MD-AS-04	69478	13.64	302320	16.05	86286	20.51
04 MD-AS-05	66381	13.66	299688	16.11	86512	20.58
05 MD-AS-05DUP	70119	13.70	300031	16.13	88280	20.58
06 MD-AS-08	70128	13.67	293934	16.07	89169	20.54

IS1 = Bromochloromethane
 IS2 = 1,4-Difluorobenzene
 IS3 = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area

AREA LOWER LIMIT = - 40% of internal standard area

RT UPPER LIMIT = +0.50 minutes of internal standard RT

RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

TO-14A SIM

CASE NARRATIVE
VOLATILE ORGANIC ANALYSIS

CLIENT/PROJECT: Modine

ANALYTICAL METHOD: TO-14A SIM

LABORATORY: CH2M HILL Applied Sciences Lab

PROJECT NO.: 179143.AS.01

LAB CODE: CVO

LAB BATCH NO.: 9040

I. RECEIPT

A. Date: March 21, 2003

B. Sample Information

LAB SAMPLE ID	CLIENT SAMPLE ID	CANISTER ID	SAMPLE MATRIX	DATE SAMPLED	TIME SAMPLED	RECEIVED PRESS. (torr)
904001	MD-AS-01	529	Air	03/19/2003	10:33	729
904002	MD-AS-02	655	Air	03/19/2003	10:38	703
904003	MD-AS-03	558	Air	03/19/2003	10:52	282
904004	MD-AS-04	607	Air	03/19/2003	10:54	598
904005	MD-AS-05	584	Air	03/19/2003	11:07	515
904006	MD-AS-06	571	Air	03/19/2003	11:22	717
904007	MD-AS-07	544	Air	03/19/2003	11:37	756
904008	MD-AS-08	502	Air	03/19/2003	11:07	382
904009	MD-AS-B1	546	Air	03/19/2003	11:45	0

II. Holding Times:

All acceptance criteria were met.

III. Analysis:

A. Calibration:

All acceptance criteria were met.

B. Blanks:

All acceptance criteria were met.

C. Duplicate Sample(s):

All acceptance criteria were met.

D. Instrument Performance Check:

All acceptance criteria were met.

E. Surrogate Recoveries:

All acceptance criteria were met.

F. Internal Standards:

All acceptance criteria were met.

G. Laboratory Control Sample (LCS)

All acceptance criteria were met.

H. Matrix Spike(MS)/Matrix Spike Duplicate(MSD)
Not applicable.

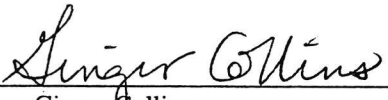
I. Analytical Exception:
None.

J. Other:
None

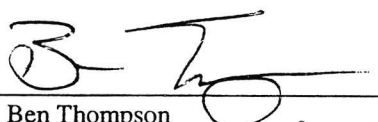
IV. Sampling Equipment Exceptions:
None.

V. Documentation Exceptions:
None.

VI. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

SIGNED: 
Ginger Collins
Analytical Chemist

DATE: 4/8/03

REVIEWED: 
Ben Thompson
Organics Supervisor

DATE: 4/9/03

**SAMPLE DATA
SUMMARY**

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-01

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904001

Level: (low/med) LOW Lab File ID: 904001R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 1.93

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	31	U
79-01-6	Trichloroethene	21900	E
127-18-4	Tetrachloroethene	200	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-02

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904002

Level: (low/med) LOW Lab File ID: 904002R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 2.01

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	32	U
79-01-6	Trichloroethene	102000	E
127-18-4	Tetrachloroethene	517	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-02DUP

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904002D

Level: (low/med) LOW Lab File ID: 904002D.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 2.01

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	32	U
79-01-6	Trichloroethene	103000	E
127-18-4	Tetrachloroethene	501	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-03

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904003

Level: (low/med) LOW Lab File ID: 904003.D

GC Column: , DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 1.12

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	18	U
79-01-6	Trichloroethene	67100	E
127-18-4	Tetrachloroethene	578	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-04

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904004

Level: (low/med) LOW Lab File ID: 904004.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.50

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	9	
79-01-6	Trichloroethene	76100	E
127-18-4	Tetrachloroethene	443	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904005

Level: (low/med) LOW Lab File ID: 904005.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.58

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	15	
79-01-6	Trichloroethene	57100	E
127-18-4	Tetrachloroethene	602	E

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05DL

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904005DL

Level: (low/med) LOW Lab File ID: 904005R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 04/08/03

Dilution Factor: 3.19

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	51	U
79-01-6	Trichloroethene	47500	E
127-18-4	Tetrachloroethene	459	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-06

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904006

Level: (low/med) LOW

Lab File ID: 904006R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 1.06

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	17	U
79-01-6	Trichloroethene	53000	E
127-18-4	Tetrachloroethene	528	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-07

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904007

Level: (low/med) LOW

Lab File ID: 904007R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.36

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	6	U
79-01-6	Trichloroethene	204	
127-18-4	Tetrachloroethene	53	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-08

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904008

Level: (low/med) LOW Lab File ID: 904008.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.72

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	15	
79-01-6	Trichloroethene	56000	E
127-18-4	Tetrachloroethene	582	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-B1

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904009

Level: (low/med) LOW Lab File ID: 904009.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	25	
127-18-4	Tetrachloroethene	4	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB2_0327

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB2_0327

Level: (low/med) LOW

Lab File ID: XB2_0327.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB2_0408

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB2_0408

Level: (low/med) LOW

Lab File ID: XB2_0408.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 04/08/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO.	COMPOUND	PPTV	Q
75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB1_0401

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB1_0401

Level: (low/med) LOW

Lab File ID: XB1_0401.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 04/01/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO.	COMPOUND	PPTV	Q
75-01-4	Vinyl chloride	4	U
79-01-6	Trichloroethene	4	U
127-18-4	Tetrachloroethene	4	U

QC SUMMARY

2A
VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

	EPA SAMPLE NO.	SMC1 #	TOT OUT
01	XB2_0327	96	0
02	MD-AS-01	77	0
03	MD-AS-02	89	0
04	MD-AS-02DUP	105	0
05	MD-AS-03	108	0
06	MD-AS-04	117	0
07	MD-AS-05	121	0
08	MD-AS-06	106	0
09	MD-AS-07	93	0
10	MD-AS-08	104	0
11	MD-AS-B1	84	0

SMC1 ppbv = Bromofluorobenzene

QC LIMITS
(70-130)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D System Monitoring Compound diluted out

2A
VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

	EPA SAMPLE NO.	SMC1 #	TOT OUT
01	XB1_0401	104	0
02	XB2_0408	111	0
03	MD-AS-05DL	98	0

SMC1 ppbv = Bromofluorobenzene

QC LIMITS
(70-130)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D System Monitoring Compound diluted out

3
DUPLICATES
VOLATILE ORGANIC ANALYSIS

Lab Name: Applied Sciences Laboratory
Lab Code: CVO
Lab File ID: C:\HPCHEM\1\DATA\032703G1\904002.D
Lab File ID: C:\HPCHEM\1\DATA\032703G1\904002D.D
Instrument ID: GODZILLA
GC Column: DB-VRX 0.25mm x 60 meters

Project No.: 179143.AS.01
Lab Batch No.: 9040
Lab Sample ID: 904002
Date Analyzed: 03/27/03
Concentration Units: PPTV

ANALYTE	CONTROL LIMIT	SAMPLE	DUPLICATE	RPD (%)
Vinyl chloride	± 30	32 U	32 U	--
Trichloroethene	± 30	102000 E	103000 E	1.0
Tetrachloroethene	± 30	517	501	3.1

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB2_0327

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040
 Lab File ID: XB2_0327.D Lab Sample ID: XB2_0327
 Date Analyzed: 03/27/03 Time Analyzed: 11:05
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
 Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	20 PPTV STD	LEVEL2	LEVEL2.D	12:24
02	50 PPTV STD	LEVEL3	LEVEL3.D	13:03
03	100 PPTV STD	LEVEL4	LEVEL4.D	13:45
04	200 PPTV STD	LEVEL5	LEVEL5.D	14:26
05	10 PPTV STD	LEVEL1	LEVEL1R.D	15:06
06	1000 PPTV STD	LEVEL6	LEVEL6.D	15:46
07	MD-AS-01	904001	904001R.D	22:00
08	MD-AS-02	904002	904002R.D	22:44
09	MD-AS-02DUP	904002D	904002D.D	23:28
10	MD-AS-03	904003	904003.D	00:18
11	MD-AS-04	904004	904004.D	01:09
12	MD-AS-05	904005	904005.D	02:00
13	MD-AS-06	904006	904006R.D	02:44
14	MD-AS-07	904007	904007R.D	03:42
15	MD-AS-08	904008	904008.D	04:37
16	MD-AS-B1	904009	904009.D	05:25

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB1_0401

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
Lab File ID: XB1_0401.D Lab Sample ID: XB1_0401
Date Analyzed: 04/01/03 Time Analyzed: 10:53
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	10 PPTV STD	LEVEL1	LEVEL1.D	11:32
02	20 PPTV STD	LEVEL2	LEVEL2.D	12:16
03	50 PPTV STD	LEVEL3	LEVEL3.D	13:12
04	100 PPTV STD	LEVEL4	LEVEL4.D	13:52
05	200 PPTV STD	LEVEL5	LEVEL5.D	14:36
06	1000 PPTV STD	LEVEL6	LEVEL6.D	15:24

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB2_0408

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
Lab File ID: XB2_0408.D Lab Sample ID: XB2_0408
Date Analyzed: 04/08/03 Time Analyzed: 13:35
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	CV1_0408	CV1_0408	CV1_0408.D	14:22
02	MD-AS-05DL	904005DL	904005R.D	15:03

COMMENTS:

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date(s): 03/27/03 03/27/03
 Heated Purge (Y/N): N Calibration Times: 12:24 15:46
 GC Column: DB-VRX ID: 0.25 (mm)

LAB FILE ID:

RRF1 = LEVEL1R.D RRF2 = LEVEL2.D RRF3 = LEVEL3.D
 RRF4 = LEVEL4.D RRF5 = LEVEL5.D RRF6 = LEVEL6.D

COMPOUND	RRF1	RRF2	RRF3	RRF4	RRF5	RRF6	<u>RRF</u>	% RSD
Vinyl chloride	0.110	0.096	0.102	0.130	0.133	0.111	0.114	13.1
Trichloroethene	0.042	0.029	0.030	0.034	0.034	0.028	0.033	15.8
Tetrachloroethene	0.032	0.022	0.022	0.025	0.029	0.023	0.025	16.0
Bromofluorobenzene	0.591	0.760	0.621	0.535	0.573	0.433	0.586	18.3

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date(s): 04/01/03 04/01/03
 Heated Purge (Y/N): N Calibration Times: 11:32 15:24
 GC Column: DB-VRX ID: 0.25 (mm)

LAB FILE ID:

RRF1 = LEVEL1.D RRF2 = LEVEL2.D RRF3 = LEVEL3.D
 RRF4 = LEVEL4.D RRF5 = LEVEL5.D RRF6 = LEVEL6.D

COMPOUND	RRF1	RRF2	RRF3	RRF4	RRF5	RRF6	$\overline{\text{RRF}}$	% RSD
Vinyl chloride	0.067	0.090	0.097	0.086	0.103	0.101	0.091	14.7
Trichloroethene	0.040	0.029	0.027	0.022	0.024	0.024	0.027	23.6
Tetrachloroethene	0.025	0.023	0.021	0.019	0.021	0.021	0.022	9.4
Bromofluorobenzene	0.520	0.477	0.600	0.481	0.541	0.566	0.531	9.1

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
Instrument ID: GC/MS - G Calibration Date: 04/08/03 Time: 14:22
Lab File ID: CV1_0408.D Init. Calib. Date(s): 04/01/03 04/01/03
Heated Purge: (Y/N) N Init. Calib. Times: 11:32 15:24
GC Column: DB-VRX ID: 0.25 (mm)

COMPOUND	RRF	RRF4		% D	MAX % D
Vinyl chloride	0.091	0.097		-6.7	30
Trichloroethene	0.027	0.025		10.0	30
Tetrachloroethene	0.022	0.028		-28.9	30
Bromofluorobenzene	0.531	0.470		11.5	30

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040
 Lab File ID (Standard): LEVEL4.D Date Analyzed: 03/27/03
 Instrument ID: GC/MS - G Time Analyzed: 13:45
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

	IS1ppbv AREA #	RT #	IS2ppbv AREA #	RT #	IS3ppbv AREA #	RT #
24 HOUR STD	1236	14.31	5098	16.90	3513	21.56
UPPER LIMIT	1730	14.81	7137	17.40	4918	22.06
LOWER LIMIT	742	13.81	3059	16.40	2108	21.06
EPA SAMPLE NO.						
01 MD-AS-01	1084	14.22	5051	16.87	3489	21.52
02 MD-AS-02	1150	14.25	5324	16.89	3983	21.53
03 MD-AS-02DUP	1180	14.27	5438	16.90	3877	21.52
04 MD-AS-03	1269	14.29	5905	16.92	4167	21.55
05 MD-AS-04	1220	14.31	6097	16.93	4087	21.55
06 MD-AS-05	1257	14.32	6220	16.93	4138	21.54
07 MD-AS-06	1294	14.29	5831	16.90	4456	21.50
08 MD-AS-07	1264	14.30	6214	16.93	4273	21.53
09 MD-AS-08	1327	14.32	6686	16.94	4500	21.55
10 MD-AS-B1	1256	14.34	5806	16.96	3462	21.57

IS1 ppbv = Bromochloromethane
 IS2 ppbv = 1,4-Difluorobenzene
 IS3 ppbv = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area
 AREA LOWER LIMIT = - 40% of internal standard area
 RT UPPER LIMIT = +0.50 minutes of internal standard RT
 RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
 Lab File ID (Standard): LEVEL4.D Date Analyzed: 04/01/03
 Instrument ID: GC/MS - G Time Analyzed: 13:52
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

	IS1ppbv AREA #	RT #	IS2ppbv AREA #	RT #	IS3ppbv AREA #	RT #
24 HOUR STD	2024	14.32	9315	16.93	5844	21.57
UPPER LIMIT	2834	14.82	13041	17.43	8182	22.07
LOWER LIMIT	1214	13.82	5589	16.43	3506	21.07
EPA SAMPLE NO.						
01 XB2_0408	1645	14.19	7560	16.82	3762	21.47

IS1 ppbv = Bromochloromethane
 IS2 ppbv = 1,4-Difluorobenzene
 IS3 ppbv = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area

AREA LOWER LIMIT = - 40% of internal standard area

RT UPPER LIMIT = +0.50 minutes of internal standard RT

RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
 Lab File ID (Standard): CV1_0408.D Date Analyzed: 04/08/03
 Instrument ID: GC/MS - G Time Analyzed: 14:22
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

	IS1ppbv AREA #	RT #	IS2ppbv AREA #	RT #	IS3ppbv AREA #	RT #
24 HOUR STD	1721	14.16	7710	16.81	4958	21.45
UPPER LIMIT	2409	14.66	10794	17.31	6941	21.95
LOWER LIMIT	1033	13.66	4626	16.31	2975	20.95
EPA SAMPLE NO.						
01 MD-AS-05DL	1878	14.13	8823	16.78	5591	21.43

IS1 ppbv = Bromochloromethane
 IS2 ppbv = 1,4-Difluorobenzene
 IS3 ppbv = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area

AREA LOWER LIMIT = - 40% of internal standard area

RT UPPER LIMIT = +0.50 minutes of internal standard RT

RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

CH2MHill Applied Sciences Lab
CHAIN OF CUSTODY RECORD
AND AGREEMENT TO PERFORM SERVICES

CVO 2300 NW Walnut Boulevard
Corvallis, OR 97330-3538
(541) 752-4271 FAX (541) 752-0276

COC # _____

Project # 179143		Purchase Order #		Requested Analytical Method #										THIS AREA FOR LAB USE ONLY					
Project Name Modine		Company Name CH2M Hill - St. Louis												TOTAL # OF CONTAINERS TO-14 Scan *SIM*			Lab # 01040		
Report to: Dan Price		Phone No: 314-421-0900		Preservative													EPA Tier QC Level 1 (Screening) 2 3 4		
Requested Completion Date: Standard TAT		Sample Disposal: Dispose <input checked="" type="checkbox"/> Return <input type="checkbox"/>																	
Sampling		Type	Matrix	CLIENT SAMPLE ID (8 CHARACTERS)								LAB QC		Alternate Description			Lab ID		
Date	Time	C O M P	G R A B	W A T E R	S O I L	A I R	Other												
3/14/20	10:33	X				X		M D - A S - 0 1									529	-1	
3/14/20	10:38	X				X		M D - A S - 0 2									455	-2	
	10:52	X				X		M D - A S - 0 3									558	-3	
	10:54	X				X		M D - A S - 0 4									607	-4	
	11:07	X				X		M D - A S - 0 5									584	-5	
	11:25	X				X		M D - A S - 0 6									571	-6	
	11:37	X				X		M D - A S - 0 7									544	-7	
	11:07	X				X		M D - A S - 0 8									502	-8	
	11:45	X				X		M D - A S - B 1									546 512	-9	
Relinquished By Dan Price		Date/Time 3/20/20 12:05		Received By										Date/Time					
Sampled By and Title Dan Price		(Please sign and print name)		Date/Time		Relinquished By										(Please sign and print name)			Date/Time
Received By Carrie Steen		(Please sign and print name)		Date/Time 3/21/20 11:30		Relinquished By										(Please sign and print name)			Date/Time
Received By		(Please sign and print name)		Date/Time		Shipped Via UPS Fed-Ex Other _____										Shipping #			

Special Instructions:
*** SIM for TCE, PCE, & vinyl chloride if Scan concentrations are below RL of 1 ppb/v**

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client
Rev 2/01 Lab form 340



CH2MHILL
Applied Sciences Group

Sample Receipt Record

Batch Number: 9040

Date/Time Received: 3/21/03

Client/Project: MOORE

Temperature: N/A

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	YES	NO	*HD
Were custody seals intact and on the outside of the cooler?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Was the Chain of Custody inside the cooler?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Was the Chain of Custody properly filled out?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the sample containers in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Was there ice in the cooler?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

If the answer to any of the questions above is NO, a Sample Receipt Exceptions Report Must be written.

VERIFICATION OF SAMPLE PRESERVATION (verify all preserved samples except HAAs, HANs and CH)

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	Phenol pH <2, FAS	<input checked="" type="checkbox"/> Other (specify)	N/A (soils/unpres)
1							<input checked="" type="checkbox"/>	
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
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30								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Combsley 3/21/03/130

Date/Time

Date/Time

APPENDIX D
NIOSH Method Results

ZIP 65020



Survey Date August 11 & 12, 2003

[illegible]

STEL - Short Term Excursion Limit or 15 minute Time
Weighted Average Exposure Limit
OEL - Occupational Exposure Limit

Air Sampling Data Sheet

Client Modine MFG

Address 636 Sunset Dr

City Camdenton

State MO

ZIP 65020



Accredited since 1978
Lab ID 101077

Parker Services Project Number 03-100-040-

Survey Date August 11 & 12, 2003

SAMPLE DATA					ANALYTICAL RESULTS			
Sample #	Employee / Operation	Contaminant	Air Vol (L)	Total Time (min)	Concentration	OSHA PEL	ACGIH TLV	Other OEL
C-2	Turret Press, West End of Weld Area	Cis-1,2-Dichloroethene	15.9	464	<0.2 ppm	200 ppm	200 ppm	
	8/11/03	Methylene chloride			<0.2 ppm	25 ppm	50 ppm	
		Tetrachloroethene			<0.1 ppm	100 ppm	25 ppm	
		Trichloroethene			<0.1 ppm	100 ppm	50 ppm	
		Vinyl chloride			<0.02 ppm	1 ppm	1 ppm	
C-13	Turret Press, West End of Weld Area	Cis-1,2-Dichloroethene	15.8	459	<0.2 ppm	200 ppm	200 ppm	
	8/12/03	Methylene chloride			<0.2 ppm	25 ppm	50 ppm	
		Tetrachloroethene			<0.1 ppm	100 ppm	25 ppm	
		Trichloroethene			<0.1 ppm	100 ppm	50 ppm	
		Vinyl chloride			<0.02 ppm	1 ppm	1 ppm	
COMMENTS:					METHODS: NIOSH 1003, 1005, 1022, 1007			

ppm - parts per million
ppb - parts per billion
BDL - Below analytical detection limit
NA - Not Applicable
NE - Not Established

mg/m³ - milligrams per cubic meter
 µg/m³ - micrograms per cubic meter
 C - Ceiling limit not to be exceeded
 f/cc - fibers per cubic centimeter
 µg/ft² - micrograms per square foot

STEL - Short Term Excursion Limit or 15 minute Time
Weighted Average Exposure Limit
OEL - Occupational Exposure Limit